many crops will not extend any deeper in the earth than the atmosphere penetrates, whilst other crops never mature if their roots reach the region of perpetual moisture; 6, it generates an acid or some other quality injurious to vegetable life.

As to the first point, it is a self-evident proposition, that when the earth is filled with water the atmosphere is excluded, for the atmosphere fills up all space which would otherwise remain unoccupied. The roots of the growing crops ordinarily descend to the depth to which the atmosphere is freely admitted, and on most soils that is determined by the plow. This is clearly illustrated by observing the field after heavy rains, when it will be discovered that the length of the roots is governed by the depth to which the earth has been broken. This is especially noticeable in the very narrow space in which the point of the cast plow goes deepest, for this space is entirely filled with the roots of the crop. One great object of plowing is to admit the air into the soil; when the crop is clean and has a slight crust, and is very soft beneath, I know of no other object for plowing.

Secondly: It is almost purely a question of observation. Every planter has noticed hard bottoms become soft and friable by ditching; this is so generally known that it might be argued that all hard lands are owing to an excess of water. After having been thoroughly saturated for some time, portions of the earth are dissolved, and on drying become hard. So, while the water is present, the atmosphere is excluded, and as the water evaporates the closeness and hardness of the soil continue to exclude the atmosphere.

Thirdly: It retards decomposition, and thereby renders the soil less capable of sustaining the growing crop. It is not known what length of time is required to decompose vegetable matter entirely submerged, for the atmosphere is the chief agent in decomposition, and every fact and argument that shows that an excess of water excludes the atmosphere from the soil, equally tends to show that it retards decomposition. In illustration of this, it is well known that the compost heap may be put up so wet that fermentation will not take place.

Fourthly: It renders the soil colder by evaporation, and consequently the crop more backward. This may be well illustrated by placing a kettle of water over the fire for some minutes. The water is only slightly warm, if so at all, what has become of the heat applied to the kettle? It has been received by the water in a latent condition. In the spring of the year, while the heat of the sun would have been warming the soil, it is engaged in evaporating the excess of water. In our short seasons would it not be much better to drain the water off with the spade, for the surplusage must be disposed of by the sun or the spade, before the soil becomes fit for cultivation.

Fifthly. There are some soils in which the roots of the crop seem to be limited in their downward tendency by atmospherical influence. In freshly cleared land, which is imperfectly drained, it may be observed that the roots of corn descend to a certain distance with great regularity; it will